

DEVICE SPECIFICATION FOR
TFT-LCD Module
MODEL No.
LQ0DZA0090

These parts have corresponded with the RoHS directive.

RECORDS OF REVISION

LQ0DZA0090

[illegible]

1. Application

This specification applies to the color 28.05inch 2048x2048 TFT-LCD module LQ0DZA0090.

- ◎In case of using the device for applications such as control and safety equipment for transportation(aircraft, trains, automobiles, etc.), rescue and security equipment and various safety related equipment which require higher reliability and safety, take into consideration that appropriate measures such as fail-safe functions and redundant system design should be taken.
- ◎Do not use the device for equipment that requires an extremely high level of reliability, such as medical equipment for life support.

2. Overview

This module is a color active matrix LCD module incorporating amorphous silicon TFT (Thin Film Transistor). It is composed of a color TFT-LCD panel, driver ICs, control circuit, power supply circuit a backlight unit ,and backlight inverters. Graphics and texts can be displayed on a $2048 \times 3 \times 2048$ dots panel with about 16.77 million colors (8 bit) by supplying 192 bit data signals($8\text{bit} \times 2\text{pixel} \times \text{RGB} \times 4$), eight display enable signals, and eight dot clock signals by LVDS, and +12V DC supply voltages for TFT-LCD panel driving and back light. The backlight inverters are built into this module.

3. Mechanical Specifications

Parameter	Specifications	Unit
Display size	71.2 (Diagonal)	cm
	28.05 (Diagonal)	Inch
Active area	503.808 (H) $\times$ 503.808 (V)	mm
Pixel format	2048 (H) $\times$ 2048 (V)	Pixel
	(1 pixel = R + G + B dots)	
Pixel pitch	0.246 (H) $\times$ 0.246 (V)	mm
Pixel configuration	R,G,B vertical stripe	
Display mode	Normally Black	
Unit outline dimensions *1	594 (W) $\times$ 594 (H) $\times$ 60(*1)/83(*2) (D)	mm
Mass	15 Typ	kg
Surface treatment	Anti-glare and hard-coating 2H	

*1.Note: The thickness of module (D) doesn't contain the projection.

*2.Note: The thickness of module (D) contains the projection.

Outline dimensions are shown in Fig.4 and Fig.5.

4. Input Terminals and their function

4-1. Interface signals

CN1(A area), CN2(B area), CN3(C area), CN4(D area) in Fig.1

Using connector : 10240-1210VE (3M)

Mating connector : 10140-□□□□○○ (3M)

Using LVDS Receiver : DS90CF386(National Semiconductor Corp.) or THC63LVDF84B(Thine)

Pin Diagrams(CN1 - CN4)

Pin No.	Symbol	Function	Remark
1	NC	OPEN	—
2	RxBIN3+	Positive (+) LVDS differential data input CH3(B port)	LVDS
3	GND	GND	GND
4	RxBIN3—	Negative (—) LVDS differential data input CH3(B port)	LVDS
5	RxBCLKIN+	Positive (+) LVDS differential clock input (B port)	LVDS
6	GND	GND	GND
7	RxBCLKIN—	Negative (—) LVDS differential clock input (B port)	LVDS
8	NC	OPEN	—
9	NC	OPEN	—
10	RxBIN2+	Positive (+) LVDS differential data input CH2(B port)	LVDS
11	GND	GND	GND
12	RxBIN2—	Negative (—) LVDS differential data input CH2(B port)	LVDS
13	RxBIN1+	Positive (+) LVDS differential data input CH1(B port)	LVDS
14	GND	GND	GND
15	RxBIN1—	Negative (—) LVDS differential data input CH1(B port)	LVDS
16	NC	OPEN	—
17	NC	OPEN	—
18	RxBIN0+	Positive (+) LVDS differential data input CH0(B port)	LVDS
19	GND	GND	GND
20	RxBIN0—	Negative (—) LVDS differential data input CH0(B port)	LVDS
21	RxAIN3+	Positive (+) LVDS differential data input CH3(A port)	LVDS
22	GND	GND	GND
23	RxAIN3—	Negative (—) LVDS differential data input CH3(A port)	LVDS
24	NC	OPEN	—
25	NC	OPEN	—
26	RxACLKIN+	Positive (+) LVDS differential clock input (A port)	LVDS
27	GND	GND	GND
28	RxACLKIN—	Negative (—) LVDS differential clock input (A port)	LVDS
29	RxAIN2+	Positive (+) LVDS differential data input CH2(A port)	LVDS
30	GND	GND	GND
31	RxAIN2—	Negative (—) LVDS differential data input CH2(A port)	LVDS
32	NC	OPEN	—
33	NC	OPEN	—
34	RxAIN1+	Positive (+) LVDS differential data input CH1(A port)	LVDS
35	GND	GND	GND
36	RxAIN1—	Negative (—) LVDS differential data input CH1(A port)	LVDS
37	RxAIN0+	Positive (+) LVDS differential data input CH0(A port)	LVDS
38	GND	GND	GND
39	RxAIN0—	Negative (—) LVDS differential data input CH0(A port)	LVDS
40	NC	OPEN	—

Pin arrangement is shown in Fig.5

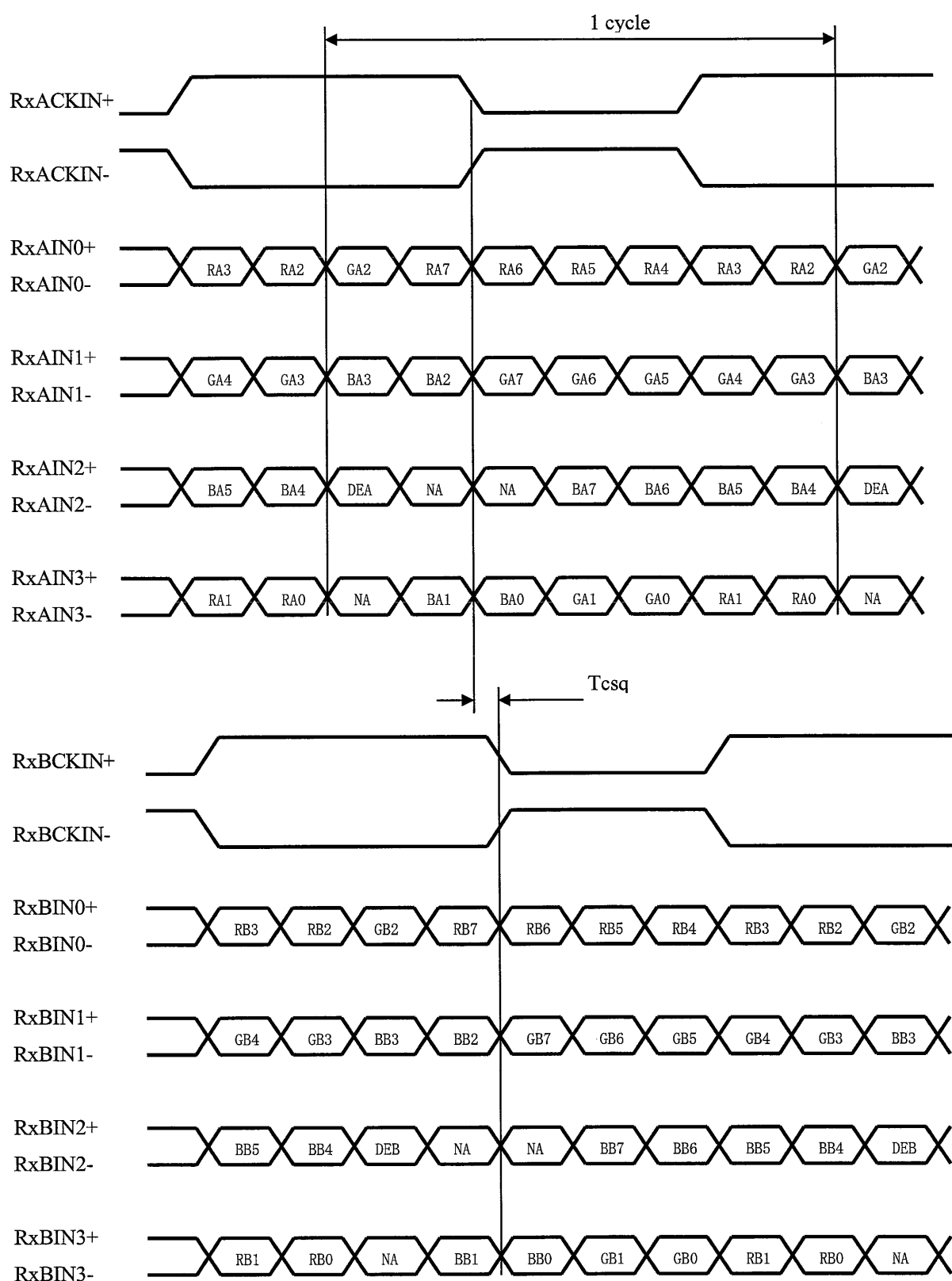
Data Mapping (National Semiconductor Corp.:DS90C385) or THC63LVDM83R(Thine)

A port Data

B port Data

Input Signal	Transmitter		Connector	Input Signal	Transmitter		Connector
	Pin	Data			Pin	Data	
RA2	51	TxIN0	RxAIN0 $\pm$	RB2	51	TxIN0	RxBIN0 $\pm$
RA3	52	TxIN1		RB3	52	TxIN1	
RA4	54	TxIN2		RB4	54	TxIN2	
RA5	55	TxIN3		RB5	55	TxIN3	
RA6	56	TxIN4		RB6	56	TxIN4	
RA7	3	TxIN6		RB7	3	TxIN6	
GA2	4	TxIN7		GB2	4	TxIN7	
GA3	6	TxIN8	RxAIN1 $\pm$	GB3	6	TxIN8	RxBIN1 $\pm$
GA4	7	TxIN9		GB4	7	TxIN9	
GA5	11	TxIN12		GB5	11	TxIN12	
GA6	12	TxIN13		GB6	12	TxIN13	
GA7	14	TxIN14		GB7	14	TxIN14	
BA2	15	TxIN15		BB2	15	TxIN15	
BA3	19	TxIN18		BB3	19	TxIN18	
BA4	20	TxIN19	RxAIN2 $\pm$	BB4	20	TxIN19	RxBIN2 $\pm$
BA5	22	TxIN20		BB5	22	TxIN20	
BA6	23	TxIN21		BB6	23	TxIN21	
BA7	24	TxIN22		BB7	24	TxIN22	
RSVD(NA)	27	TxIN24		RSVD(NA)	27	TxIN24	
RSVD(NA)	28	TxIN25		RSVD(NA)	28	TxIN25	
DE	30	TxIN26		DE	30	TxIN26	
RA0	50	TxIN27	RxAIN3 $\pm$	RB0	50	TxIN27	RxBIN3 $\pm$
RA1	2	TxIN5		RB1	2	TxIN5	
GA0	8	TxIN10		GB0	8	TxIN10	
GA1	10	TxIN11		GB1	10	TxIN11	
BA0	16	TxIN16		BB0	16	TxIN16	
BA1	18	TxIN17		BB1	18	TxIN17	
RSVD(NA)	25	TxIN23		RSVD(NA)	25	TxIN23	
CLK	31	TxCLKIN	RxACLKIN $\pm$	CLK	31	TxCLKIN	RxBCLKIN $\pm$

RSVD: Non connect



DE: Display Enable

NA: Not Available

4-2 Power supply for the TFT LCD.

CN5

Using connector : RP13A-12RC-20PB(HIROSE ELECTRIC Co.,Ltd)

Mating connector : RP13A-12PG-20SC (HIROSE ELECTRIC Co.,Ltd)

CN5

Pin No.	Symbol	Function	Remark
1	B/L 12V	Power supply for the Backlight (DC12V)	
2	B/L 12V	Power supply for the Backlight (DC12V)	
3	B/L 12V	Power supply for the Backlight (DC12V)	
4	B/L 12V	Power supply for the Backlight (DC12V)	
5	B/L 12V	Power supply for the Backlight (DC12V)	
6	B/L 12V	Power supply for the Backlight (DC12V)	
7	B/L 12V	Power supply for the Backlight (DC12V)	
8	B/L 12V	Power supply for the Backlight (DC12V)	
9	B/L GND	GND for the Backlight	
10	B/L GND	GND for the Backlight	
11	B/L GND	GND for the Backlight	
12	B/L GND	GND for the Backlight	
13	B/L GND	GND for the Backlight	
14	B/L GND	GND for the Backlight	
15	B/L GND	GND for the Backlight	
16	B/L GND	GND for the Backlight	
17	GND	GND	
18	GND	GND	
19	VCC12V	Power supply for the TFT LCD (DC12V)	
20	VCC12V	Power supply for the TFT LCD (DC12V)	

Pin arrangement is shown in Fig.5

4-3. Adjustment of Luminance

CN6

Using connector : S5B-PH-SM3-TB(J.S.T. Co. Ltd.)

Mating connector : PHR-5(J.S.T. Co. Ltd.)

Pin No.	Symbol	Function	Remarks
1	5.0V	Output terminal for output voltage.	
2	Vhign	Output terminal for output voltage to supply adjusted voltage, Vbr.	
3	Vbr	Dimmer voltage input.	
4	Vlow	Output terminal for output voltage to supply adjusted voltage, Vbr.	
5	GND	GND	

Pin arrangement is shown in Fig.5

4-4. Detection of an abnormality

CN7

Using connector : HIF3BA-10PA-2.54DS(HIROSE ELECTRIC Co.,Ltd.)

Mating connector : HIF3BA-10D-2.54R (HIROSE ELECTRIC Co.,Ltd.)

Pin No.	Symbol	Function	Remarks
1	BITE-cable	Alarm output of connection of cable for CN7.	
2	INV-U	Alarm output of backlight unit at topside.	
3	INV-M	Alarm output of backlight unit at middle side.	
4	INV-L	Alarm output of backlight unit at bottom side	
5	B/L-Fuse	Alarm output of backlight fuse.	
6	VDD-fuse	Alarm output of VDD fuse.	
7	Sig-Detect	Alarm output of detection of input signal.	
8	Reserve	For future use.	
9	GND1	GND	
10	GND2	GND	

Pin arrangement is shown in Fig.5

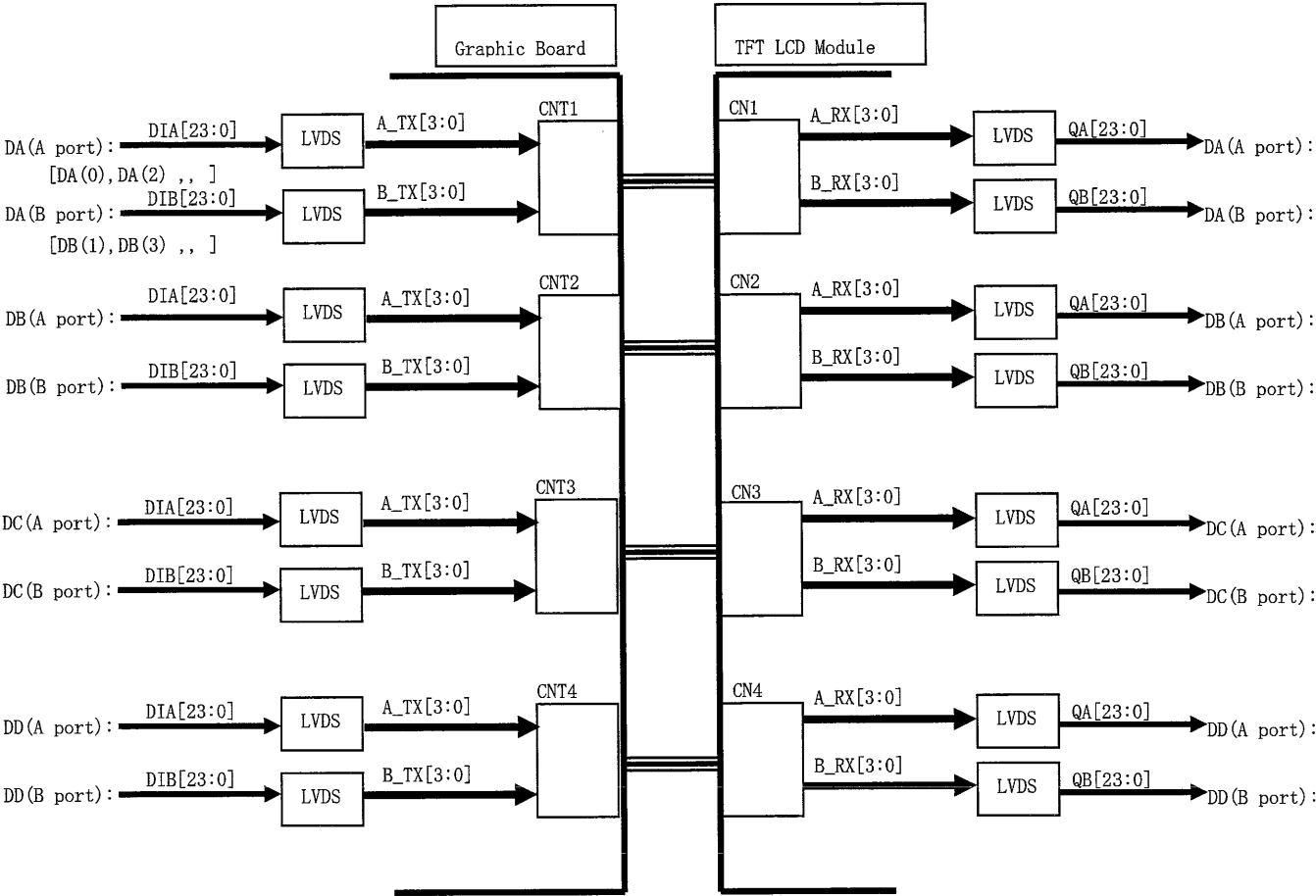
*An example of output signal when an abnormality is detected. 【Note1】

Mode of abnormality	Pin number							Remarks
	1	2	3	4	5	6	7	
VDD fuse is blown.	H	L	L	L	H	L	L	
The inverter fuse is blown.	L	L	L	L	L	L	L	
The lamp in the lamp tray at the top side is burned out or the inverter at the top side has an abnormality.	H	L	H	H	H	H	H	
The lamp in the lamp tray at the middle side is burned out or the inverter at the middle side has an abnormality.	H	H	L	H	H	H	H	
The lamp in the lamp tray at the bottom side is burned out or the inverter at the bottom side has an abnormality.	H	H	H	L	H	H	H	
No incoming signal.	H	L	L	L	H	H	L	【Note2】

【Note1】 When an abnormality is detected, an output signal is Low. When system has no problem, an output signal is High.

【Note2】 If any of input signals from CN1 to CN4 has abnormality, then low level is returned.

Interface Block



Relation between screen and pixel data

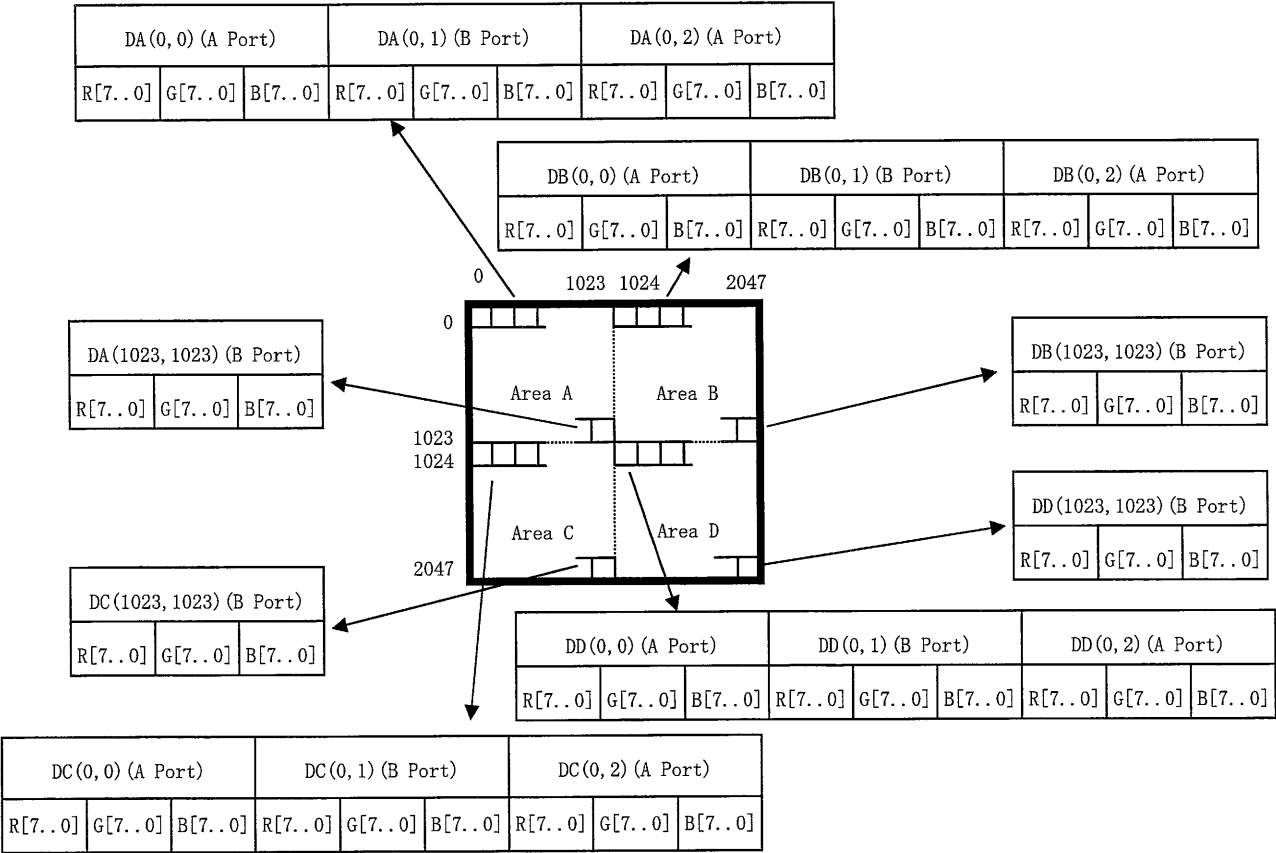


Fig.1 Relation between Data and Display Area

5. Absolute Maximum Ratings

5-1. Module

Parameter	Symbol	Condition	Ratings	Unit	Remark
Storage temperature	Tstg	—	−25 ~ +60	°C	【Note1】
Operating temperature (Ambient)	Topa	—	0 ~ +40	°C	

【Note1】 Humidity : 95%RH Max. ($T_a \leq 40^\circ\text{C}$)

Be careful for electrostatic build up, but no condensation.

In case of using the module mounted in package, inner temperature should be $+10^\circ\text{C}$ or less from ambient temperature.

5-2. TFT-LCD panel and backlight driving

Parameter	Symbol	Condition	Ratings	Unit	Remark
12V power supply voltage	Vcc_12V	Ta=25°C	0 ~ +14.0V	V	
	B/L_12V				

6. Electrical Characteristics

6-1. TFT-LCD panel driving

Ta=25°C

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
+12V supply voltage	Supply voltage	VCC12V	11.4	12.0	12.6	V 【Note1】
	Current dissipation	I _{cc}	—	1.3	2.0	A 【Note2】
	Rush current	I _r	7		A	【Note3】
		T _r	3		ms	
Permissive input ripple voltage	V _{RF}	—	—	100	mV _{P-P}	
Differential input voltage	V _{ID}	75		1000	mV	
Input Leakage Current	I _O	-10		10	μA	

6-2. Backlight driving

Ta=25°C

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
+12V supply voltage	Supply voltage	B/L 12V	11.4	12.0	12.6	V 【Note1】
	Current dissipation	I _{cc}	-	—	13.5	A
Permissive input ripple voltage	V _{RF}	—	—	100	mV _{P-P}	【Note4】

6-3. Adjustment of Luminance

Ta=25°C

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
The high level voltage that supply dimmer voltage, V _{br} .	V _{high}	3.1	3.23	3.4	V	
The low level voltage that supply dimmer voltage, V _{br} .	V _{low}	0.8	0.9	1.0	V	
Dimmer voltage input	V _{br}	V _{low}		V _{high}	V	【Note5】

【Note1】

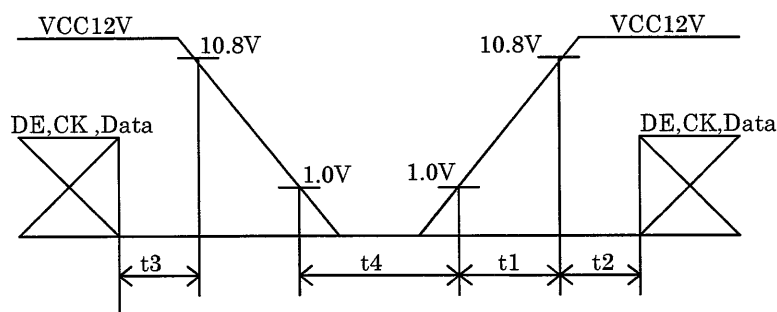
1) On-off sequences of V_{cc} and data

$$0 < t_1 \leq 60\text{ms}$$

$$0 < t_2 \leq 10\text{ms}$$

$$0 \leq t_3 \leq 1\text{s}$$

$$t_4 \geq 100\text{ms}$$

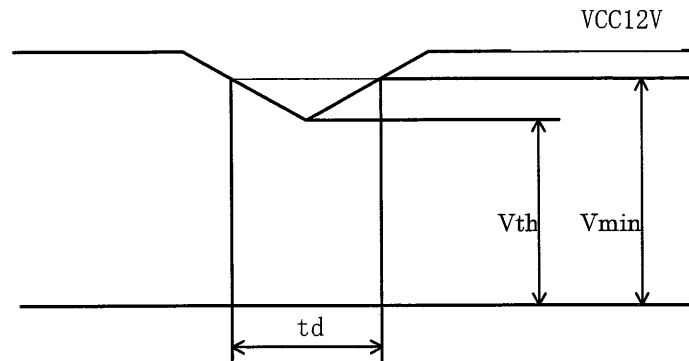


2) Dip conditions for supply voltage

(Vmin,Vth) = (11.4V,9.6V)

i) $V_{th} \leq V_{CC12V} < V_{min}$ $t_d \leq 20ms$ ii) $V_{CC12V} < V_{th}$

This case is described below *1.



*1 The LCD module shuts down when $V_{CC12V} < V_{th}$. It should also follow the 1) on-off sequence of VCC12V and data.

【Note2】

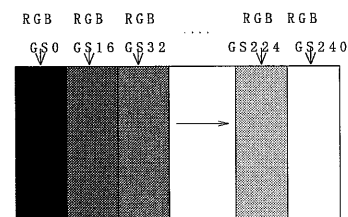
1) Typical current situation : 16-gray-bar pattern

 $V_{cc} = +12.0V$

Gray scale : GS(16N)

 $N=0 \sim 15$

The explanation of each gray scale ,GS(16n), is described below section 8.



2) Maximum current situation : The left pattern of a figure (pattern1) by using the right scale of a figure (scale1).

Note: S = 255

VS means the voltage of V255 scale.

R, G, B, R, G, B	V0, VS, V0, VS, V0, VS
R, G, B, R, G, B	V0, VS, V0, VS, V0, VS
R, G, B, R, G, B	VS, V0, VS, V0, VS, V0
R, G, B, R, G, B	VS, V0, VS, V0, VS, V0
R, G, B, R, G, B	V0, VS, V0, VS, V0, VS

Pattern1

Scale1

【Note3】 When power is supplied or when LCD starts to work by incoming input signal, the rush current flows.

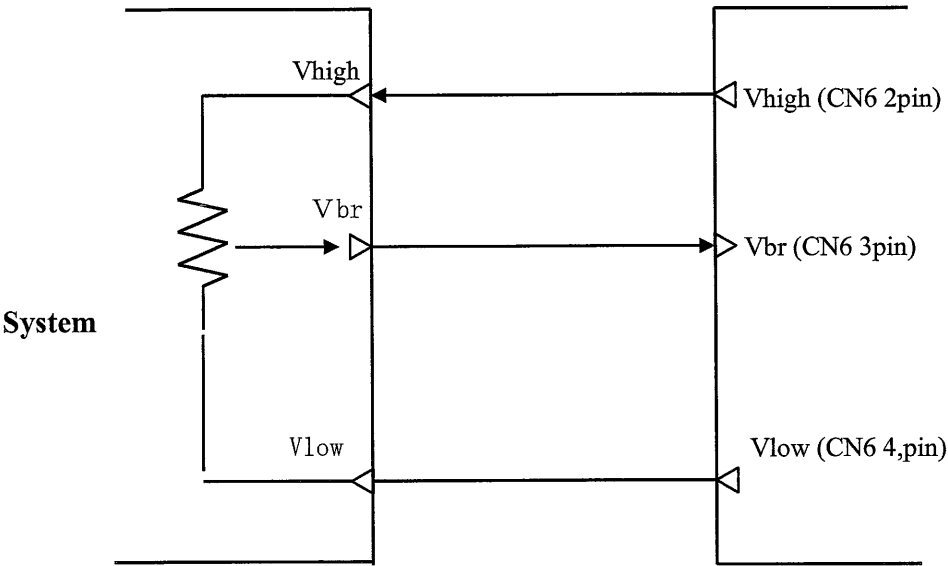
Be careful that power circuit is never less than 11V when the rush current flows.

【Note4】 It doesn't contain input ripple voltage of inverter switching by duty control.

The ripple voltage of inverter by duty control: 300mVp-p

【Note5】 Relation between Adjusted voltage Vbr and Luminance

Adjusted Voltage(Vbr)	Min.(Vlow)	↔	Max(Vhigh)
Luminance	Min. (Dimmer:Min)	↔	Max. (Dimmer:Max)



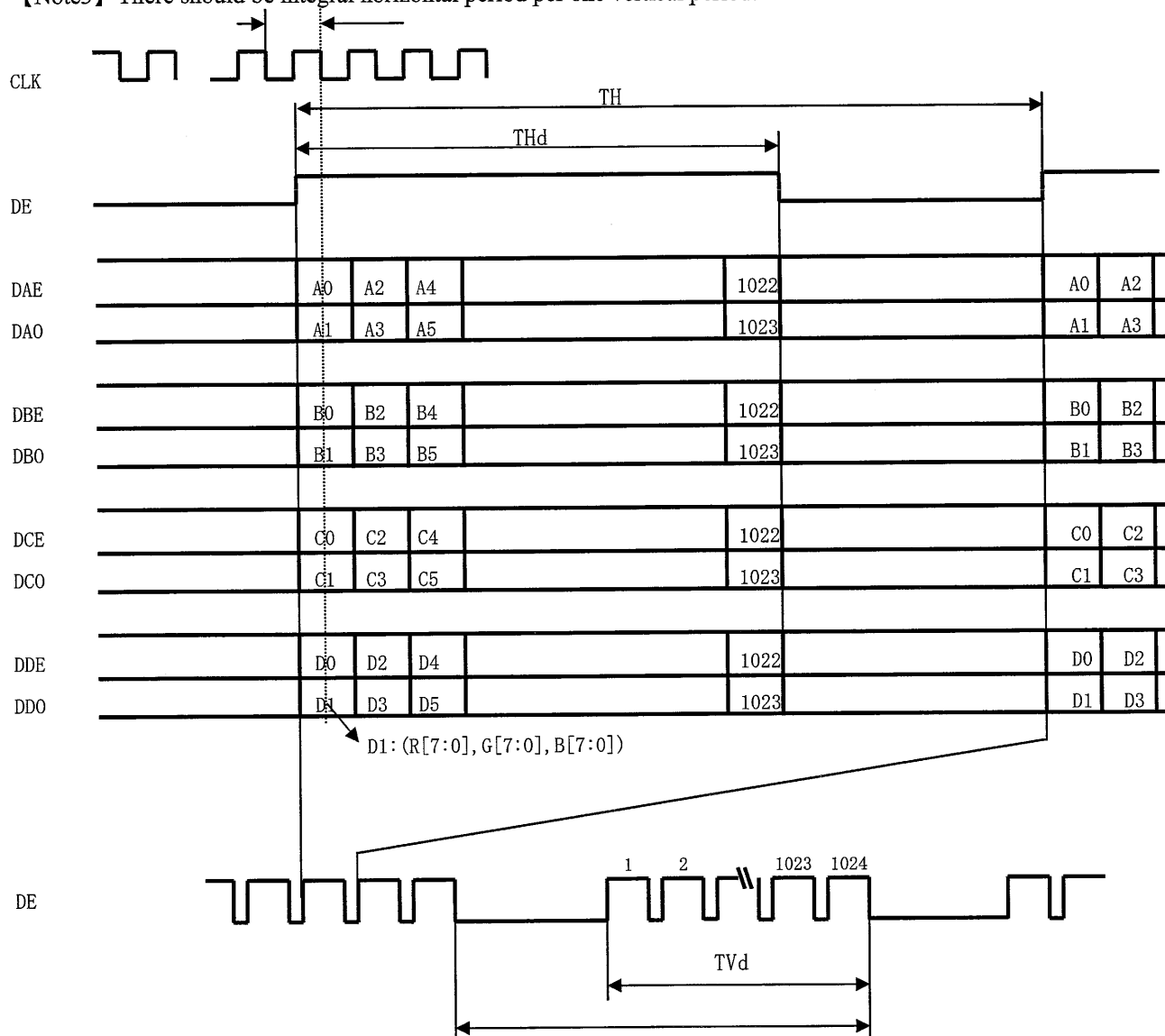
7. Timing characteristics of input signals

Parameter		Symbol	Min.	Typ.	Max.	Unit	Remark
Clock(CLK)	Frequency	1/Tc	28	35	47.3	MHz	
	Skew	Tcsq	-4	0	4	ns	【Note1】
Data Enable signal (DE)	Horizontal period	TH	528	550	860	Clock	
			12.9	15.7	19.4	μs	
	Horizontal period (Display Period)	THd	512	512	512	clock	
	Vertical period	TV	1026	1060	1535	line	【Note2】
			50	60	70	Hz	【Note3】
	Vertical period (Display Period)	TVd	1024	1024	1024	Line	

【Note1】 The difference of clock phase between LVDS port A and port B.

【Note2】 In case of using the long vertical period, the deterioration of display quality, flicker etc. may occur.

【Note3】 There should be integral horizontal period per one vertical period.



8. Input Signals, Basic Display Colors and Gray Scale of Each Color

	Colors & Gray Scale	Data Signal																											
		Gray Scale	RA0 RA1 RA2 RA3 RA4 RA5 RA6 RA7								GA0 GA1 GA2 GA3 GA4 GA5 GA6 GA7								BA0 BA1 BA2 BA3 BA4 BA5 BA6 BA7										
			RB0 RB1 RB2 RB3 RB4 RB5 RB6 RB7								GB0 GB1 GB2 GB3 GB4 GB5 GB6 GB7								BB0 BB1 BB2 BB3 BB4 BB5 BB6 BB7										
			RC0 RC1 RC2 RC3 RC4 RC5 RC6 RC7								GC0 GC1 GC2 GC3 GC4 GC5 GC6 GC7								BC0 BC1 BC2 BC3 BC4 BC5 BC6 BC7										
			RD0 RD1 RD2 RD3 RD4 RD5 RD6 RD7								GD0 GD1 GD2 GD3 GD4 GD5 GD6 GD7								BD0 BD1 BD2 BD3 BD4 BD5 BD6 BD7										
Basic Color	Black	—	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Blue	—	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1		
	Green	—	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0		
	Cyan	—	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
	Red	—	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Magenta	—	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1		
	Yellow	—	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0		
	White	—	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Gray Scale of Red	Black	GS0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	↑	GS1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Darker	GS2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	↑	↓	↓								↓								↓										
	↓	↓	↓								↓								↓										
	Brighter	GS253	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	↓	GS254	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Red	GS255	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Gray Scale of Green	Black	GS0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	↑	GS1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Darker	GS2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	↑	↓	↓								↓								↓										
	↓	↓	↓								↓								↓										
	Brighter	GS253	0	0	0	0	0	0	0	0	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0		
	↓	GS254	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0		
	Green	GS255	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0		
Gray Scale of Blue	Black	GS0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	↑	GS1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0		
	Darker	GS2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0		
	↑	↓	↓								↓								↓										
	↓	↓	↓								↓								↓										
	Brighter	GS253	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1	1	1	1		
	↓	GS254	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1		
	Blue	GS255	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1		

0 : Low level voltage, 1 : High level voltage.

Each basic color can be displayed in 256 gray scales from 8 bit data signals. According to the combination of total 192 bit data signals, the 16.77-million-color display can be achieved on the screen.

9. Optical Characteristics

Ta=25°C, VCC12V=+12V

Parameter		Symb ol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle range	Vertical	θ 11	$CR \geq 10$	70	85	—	Deg.	【Note1, 4】
		θ 12		70	85	—	Deg	
	Horizontal	θ 21, θ 22		70	85	—	Deg.	
Contrast ratio		CR	$\theta = 0^{\circ}$	400	450	—	—	【Note2, 4】
Response Time	Rise	τ r	$\theta = 0^{\circ}$	—	5	—	ms	【Note3, 4】
	Decay	τ d		—	20	—	ms	
Chromaticity of white		Wx	$\theta = 0^{\circ}$	0.283	0.313	0.343	—	【Note4】
		Wy		0.299	0.329	0.359	—	
Chromaticity of red		Rx	$\theta = 0^{\circ}$	0.577	0.607	0.637	—	
		Ry		0.309	0.339	0.369	—	
Chromaticity of green		Gx	$\theta = 0^{\circ}$	0.257	0.287	0.317	—	
		Gy		0.567	0.597	0.627	—	
Chromaticity of Blue		Bx	$\theta = 0^{\circ}$	0.115	0.145	0.175	—	
		By		0.057	0.087	0.117	—	
Luminance of white		Y_L	$\theta = 0^{\circ}$ (Dimmer:Max.)	180	225	—	cd/m ²	【Note4】
			$\theta = 0^{\circ}$ (Dimmer:Min.)	—	22.5	27		
White Uniformity		δ w	$\theta = 0^{\circ}$	—	—	1.25	—	【Note5】

※The measurement shall be executed 30 minutes after lighting at rating.

The optical characteristics shall be measured in a dark room or equivalent state with the method shown in Fig.2 below.

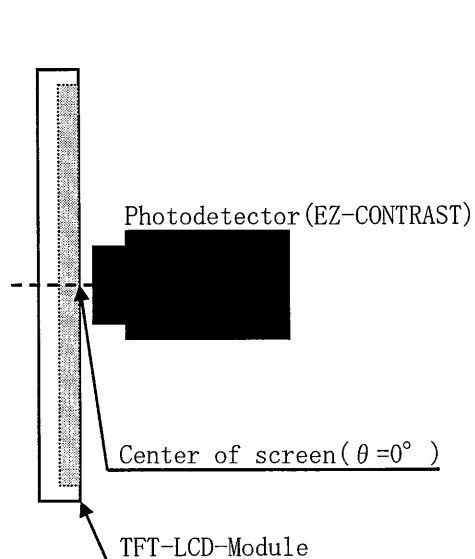


Fig2-1 Viewing angle measurement method

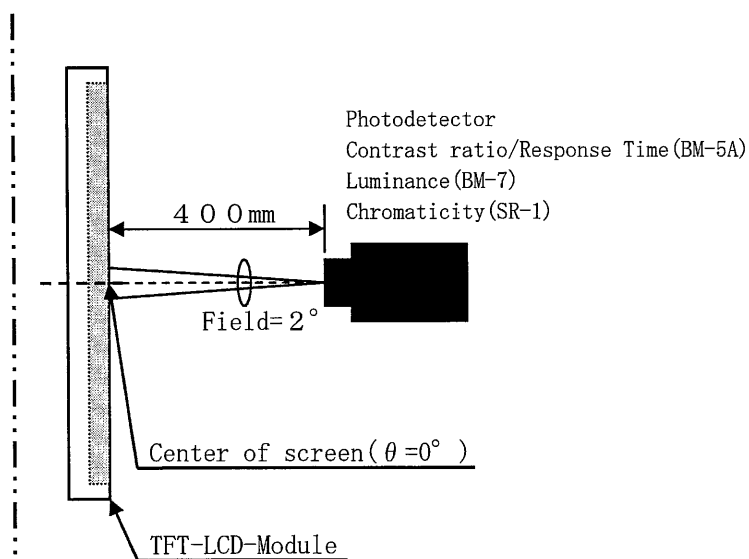
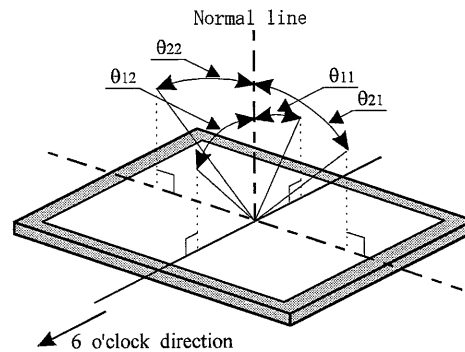


Fig2-2 Luminance/Contrast ratio/Response time/Chromaticity measurement method

Fig2 Optical characteristics measurement method

【Note1】 Definitions of viewing angle range



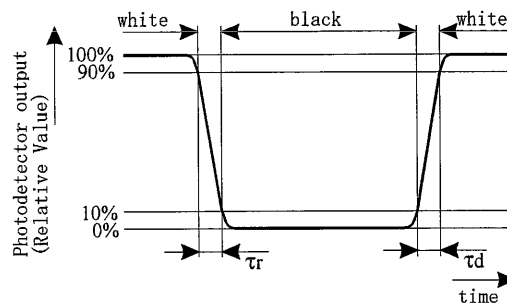
【Note2】 Definition of contrast ratio:

The contrast ratio is defined as the following.

$$\text{Contrast Ratio (CR)} = \frac{\text{Luminance (brightness) with all pixels white}}{\text{Luminance (brightness) with all pixels black}}$$

【Note3】 Definition of response time:

The response time is defined as the following figure and shall be measured by switching the input signal for "black" and "white".

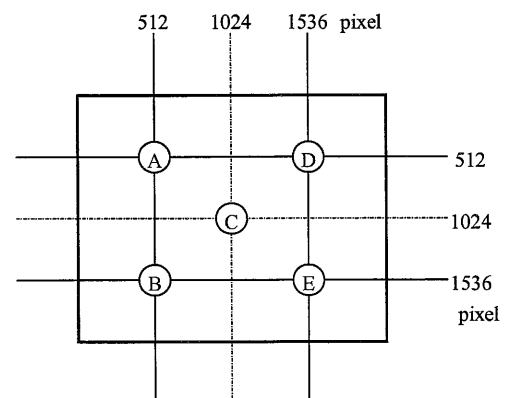


【Note4】 This shall be measured at center of the screen.

【Note5】 Definition of white uniformity:

White uniformity is defined as the following with five measurements (A~E).

$$\delta_w = \frac{\text{Maximum Luminance of five points (brightness)}}{\text{Minimum Luminance of five points (brightness)}}$$



10. Handling Precautions

- a) Be sure to turn off the power supply when inserting or disconnecting the cable from the input connector.
- b) Be sure to design the cabinet so that the module can be installed without any extra stress such as warp or twist.
- c) Since the front polarizer is easily damaged, pay attention for handling.
- d) The adhesion of water to the module may cause discoloration or spots. Wipe it off immediately.
- e) In case the panel surface is soiled, wipe it with absorbent cotton or other soft cloth.
- f) Since the panel is made of fine wires on glass, it may break or crack if dropped or bumped on hard surface. Handle with care.
- g) Since CMOS LSI is used in this module, take care of static electricity and take the human earth into consideration when handling.
- h) Make sure the four mounting holes of the module are grounded sufficiently. Take electro-magnetic interference (EMI) into consideration.
- i) The module has some printed circuit boards (PCBs) on the back. Be sure to avoid them from any stress or pressure during the handling or installing of the module; otherwise some of electronic parts on the PCBs may be damaged.
- j) Observe all other precautionary requirements in handling components.
- k) When some pressure is added on the module from rear side constantly, it causes display non-uniformity issue, functional defect, etc. So, please avoid such design.
- l) When giving a touch to the panel while turning on the power supply, it may cause degradation. In that case, once turn off the power supply, and turn on again after several seconds, and then degradation is disappeared a few seconds after turning on again.
- m) When handling LCD modules and assembling them into cabinets, please be noted that long-term storage in the environment of oxidization or deoxidization gas and the use of such materials as reagent, solvent, adhesive, resin, etc. which generate these gasses, may cause corrosion and discoloration of the LCD modules.
- n) If a minute particle enters in the module and adheres to an optical material, it may cause display non-uniformity issue, etc. Therefore, fine-pitch filters have to be installed to cooling and inhalation hole if you intend to install a fan.
- o) If you intend to install clear plate such as acryl plate and glass in front of LCD panel, be sure to set on the user set, not setting on the LCD Bezel. If any pressure is added on the Bezel, it causes display non-uniformity issue.
- p) Liquid crystal contained in the panel may leak if the LCD is broken. Rinse it as soon as possible if it gets inside your eye or mouth by mistake.
- q) Be careful when using it for long time with fixed pattern display as it may cause afterimage.
- r) Adjusting volume have been set optimally before shipment, so do not change any adjusted value.
If adjusted value is changed, the specification may not be satisfied.
- s) If a minute particle enters in the module and adheres to an optical material, it may cause display non-uniformity issue, etc. Therefore, fine-pitch filters have to be installed to cooling and inhalation hole if you intend to install a fan.

11. Shipping condition

- a) Maximum number of carton over which can be stacked: maximum 2 cartons
- b) Maximum quantity in a carton : 2 set
- c) Carton size : 794(W)*399(H)*866(D) mm
- d) Gross weight for 2 set : maximum 43 kg

Packing drawing is shown in Fig. 3.

12. Reliability test items

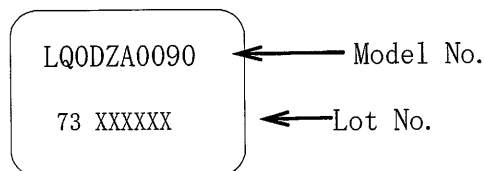
No.	Test item	Conditions
1	High temperature storage test	Ta=60°C 240h
2	Low temperature storage test	Ta=-25°C 240h
3	High temperature & high humidity operation test	Ta=40°C ; 95%RH 240h (No condensation)
4	High temperature operation test	Ta=40°C 240h (The panel temp. must be less than 60°C)
5	Low temperature operation test	Ta=0°C 240H
6	Vibration test (non- operating)	Frequency : 10~57Hz/Vibration width (one side) : 0.075mm : 57~500Hz/Gravity : 9.8m/s ² Sweep time : 11 minutes Test period : 3 hours (1 hour for each direction of X,Y,Z)
7	Shock test (non- operating)	Max. gravity : 196m/s ² Pulse width : 11ms, half-sine wave Direction : ±X, ±Y, ±Z, once for each direction.

【Result Evaluation Criteria】

Under the display quality test conditions with normal operation state, these shall be no change that may affect practical display function.

13. Others

1) Lot No. Label:



2) Adjusting volume have been set optimally before shipment, so do not change any adjusted value.

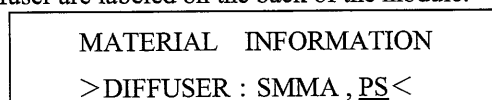
If adjusted value is changed, the specification may not be satisfied.

3) Disassembling the module can cause permanent damage and should be strictly avoided.

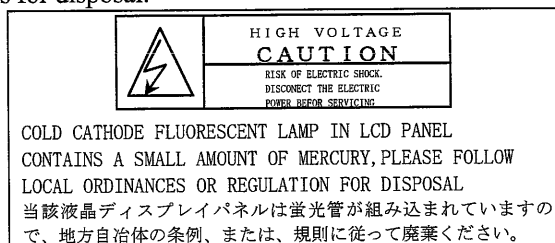
4) Please be careful since image retention may occur when a fixed pattern is displayed for a long time.

5) The chemical compound which causes the destruction of ozone layer is not being used.

6) Material information of diffuser are labeled on the back of the module.



7) Cold cathode fluorescent lamp in LCD PANEL contains a small amount of mercury, Please follow local ordinances or regulations for disposal.



© Carton storage condition

Temperature : 0°C to 40°C

Humidity : 95%RH or less

Reference condition : 20°C to 35°C , 85%RH or less (summer)

: 5°C to 15°C , 85%RH or less (winter)

• the total storage time (40°C,95%RH) : 240H or less

Sunlight : Be sure to store in unpacked condition or at dark room to avoid direct sunlight.

Atmosphere: : Never leave in a corrosive atmosphere and/or an area that volatile liquids are generated.

Cautions as to condensation:

- Do not put the carton directly on the floor. Be sure to keep on palette or stand.

Also, to keep the ventilation of the bottom of pallet/stand well, be sure to place in the same direction properly.

-Be sure to keep away from the wall of warehouse.

- Please take care of ventilation in warehouse by using ventilation system.

- Control the ambient temperature to avoid sudden temperature change.

Storage period : 1 year, in the above conditions.

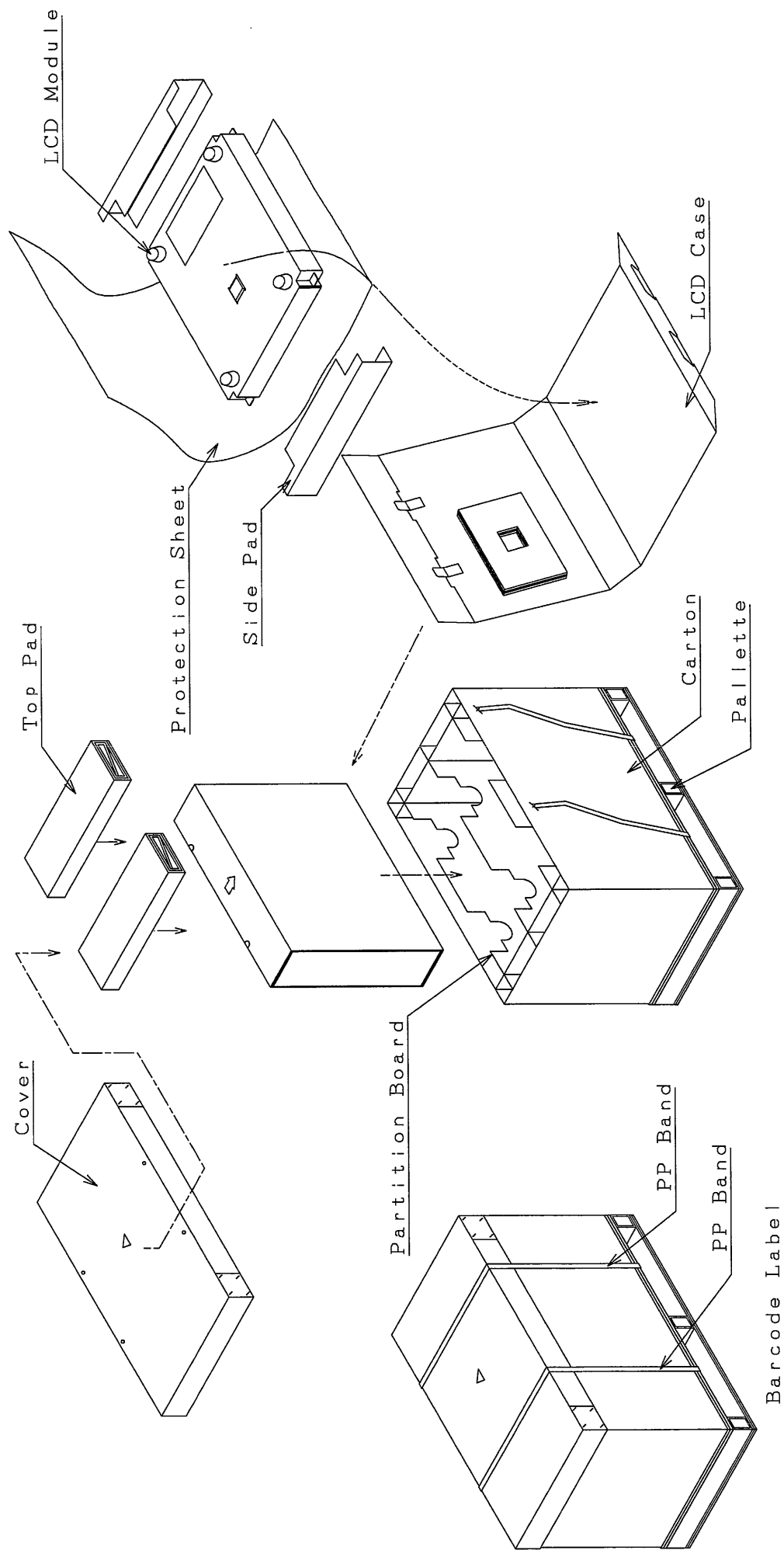


Fig. 3 Packaging form

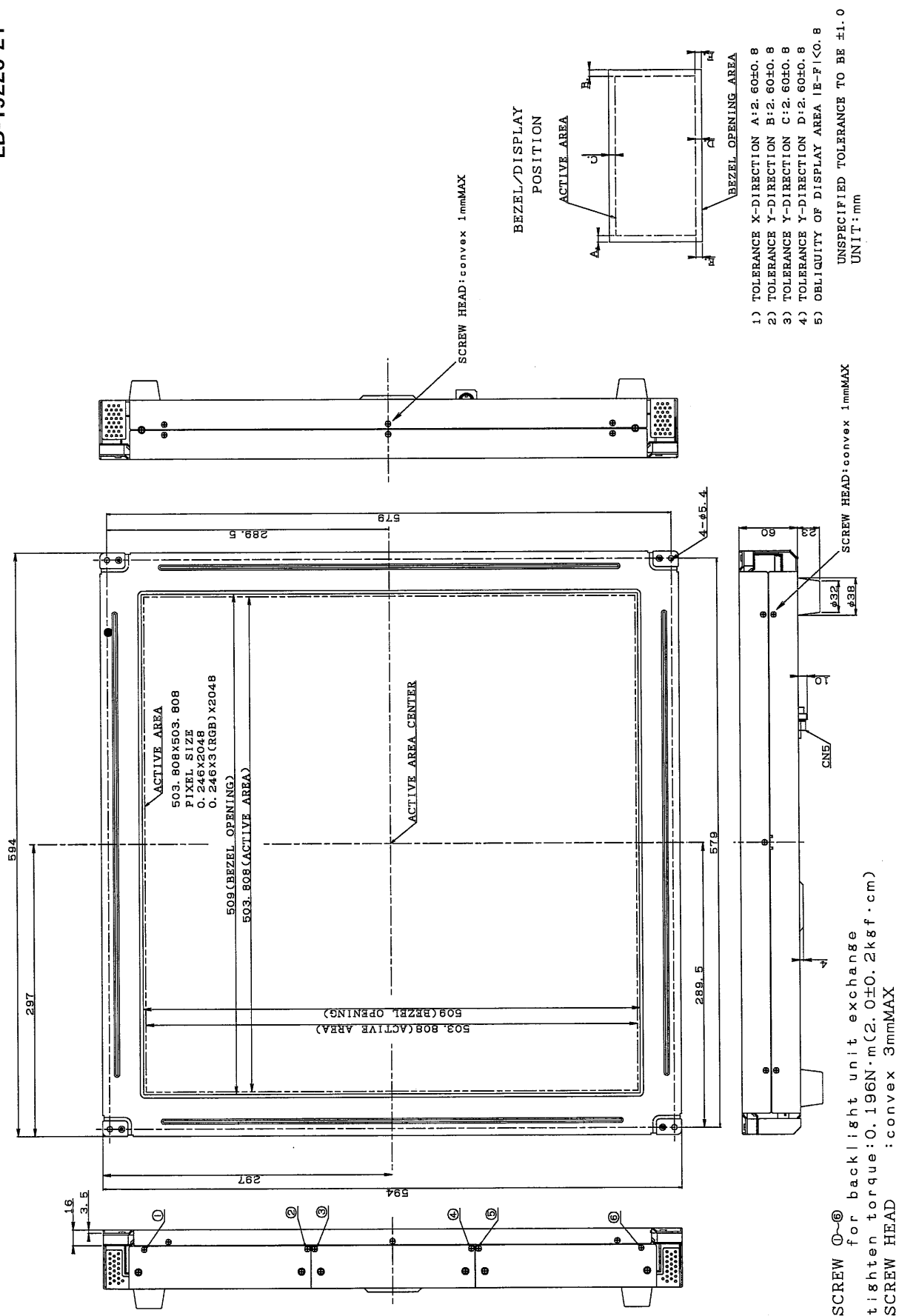
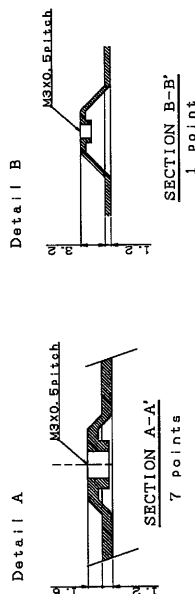
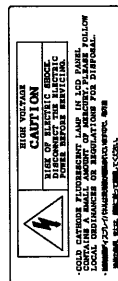


Fig. 4 MODULE OUTLINE 1/2

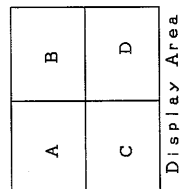
Material Label

MATERIAL INFORMATION

LQODZA0090



CN1-CN4(Display Area A.B.C.D):10240-1210VE(3M)
CN5:RP13A-12RC-20P(HIROSE ELECTRIC Co.,Ltd)
CN6:S5B-PH-SM3-1B(J.S.T.Mfg Co.,Ltd)
CN7:HiF3BA-10PA-2.54DS(HIROSE ELECTRIC Co.,Ltd)



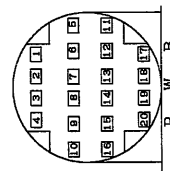
		EXB1M1-		EXB1M1+		GND		NC		EXB1M2+		EXB1M2-		GND		EXB1M3+		EXB1M3-		GND		EXB1M4+		EXB1M4-		GND		EXB1M5+		EXB1M5-		GND		EXB1M6+		EXB1M6-		GND		EXB1M7+		EXB1M7-		GND		EXB1M8+		EXB1M8-		GND		EXB1M9+		EXB1M9-		GND		EXB1M10+		EXB1M10-		GND		EXB1M11+		EXB1M11-		GND		EXB1M12+		EXB1M12-		GND		EXB1M13+		EXB1M13-		GND		EXB1M14+		EXB1M14-		GND		EXB1M15+		EXB1M15-		GND		EXB1M16+		EXB1M16-		GND		EXB1M17+		EXB1M17-		GND		EXB1M18+		EXB1M18-		GND		EXB1M19+		EXB1M19-		GND		EXB1M20+		EXB1M20-		GND		EXB1M21+		EXB1M21-		GND		EXB1M22+		EXB1M22-		GND		EXB1M23+		EXB1M23-		GND		EXB1M24+		EXB1M24-		GND		EXB1M25+		EXB1M25-		GND		EXB1M26+		EXB1M26-		GND		EXB1M27+		EXB1M27-		GND		EXB1M28+		EXB1M28-		GND		EXB1M29+		EXB1M29-		GND		EXB1M30+		EXB1M30-		GND		EXB1M31+		EXB1M31-		GND		EXB1M32+		EXB1M32-		GND		EXB1M33+		EXB1M33-		GND		EXB1M34+		EXB1M34-		GND		EXB1M35+		EXB1M35-		GND		EXB1M36+		EXB1M36-		GND		EXB1M37+		EXB1M37-		GND		EXB1M38+		EXB1M38-		GND		EXB1M39+		EXB1M39-		GND		EXB1M40+		EXB1M40-		GND		EXB1M41+		EXB1M41-		GND		EXB1M42+		EXB1M42-		GND		EXB1M43+		EXB1M43-		GND		EXB1M44+		EXB1M44-		GND		EXB1M45+		EXB1M45-		GND		EXB1M46+		EXB1M46-		GND		EXB1M47+		EXB1M47-		GND		EXB1M48+		EXB1M48-		GND		EXB1M49+		EXB1M49-		GND		EXB1M50+		EXB1M50-		GND		EXB1M51+		EXB1M51-		GND		EXB1M52+		EXB1M52-		GND		EXB1M53+		EXB1M53-		GND		EXB1M54+		EXB1M54-		GND		EXB1M55+		EXB1M55-		GND		EXB1M56+		EXB1M56-		GND		EXB1M57+		EXB1M57-		GND		EXB1M58+		EXB1M58-		GND		EXB1M59+		EXB1M59-		GND		EXB1M60+		EXB1M60-		GND		EXB1M61+		EXB1M61-		GND		EXB1M62+		EXB1M62-		GND		EXB1M63+		EXB1M63-		GND		EXB1M64+		EXB1M64-		GND		EXB1M65+		EXB1M65-		GND		EXB1M66+		EXB1M66-		GND		EXB1M67+		EXB1M67-		GND		EXB1M68+		EXB1M68-		GND		EXB1M69+		EXB1M69-		GND		EXB1M70+		EXB1M70-		GND		EXB1M71+		EXB1M71-		GND		EXB1M72+		EXB1M72-		GND		EXB1M73+		EXB1M73-		GND		EXB1M74+		EXB1M74-		GND		EXB1M75+		EXB1M75-		GND		EXB1M76+		EXB1M76-		GND		EXB1M77+		EXB1M77-		GND		EXB1M78+		EXB1M78-		GND		EXB1M79+		EXB1M79-		GND		EXB1M80+		EXB1M80-		GND		EXB1M81+		EXB1M81-		GND		EXB1M82+		EXB1M82-		GND		EXB1M83+		EXB1M83-		GND		EXB1M84+		EXB1M84-		GND		EXB1M85+		EXB1M85-		GND		EXB1M86+		EXB1M86-		GND		EXB1M87+		EXB1M87-		GND		EXB1M88+		EXB1M88-		GND		EXB1M89+		EXB1M89-		GND		EXB1M90+		EXB1M90-		GND		EXB1M91+		EXB1M91-		GND		EXB1M92+		EXB1M92-		GND		EXB1M93+		EXB1M93-		GND		EXB1M94+		EXB1M94-		GND		EXB1M95+		EXB1M95-		GND		EXB1M96+		EXB1M96-		GND		EXB1M97+		EXB1M97-		GND		EXB1M98+		EXB1M98-		GND		EXB1M99+		EXB1M99-		GND		EXB1M100+		EXB1M100-		GND		EXB1M101+		EXB1M101-		GND		EXB1M102+		EXB1M102-		GND		EXB1M103+		EXB1M103-		GND		EXB1M104+		EXB1M104-		GND		EXB1M105+		EXB1M105-		GND		EXB1M106+		EXB1M106-		GND		EXB1M107+		EXB1M107-		GND		EXB1M108+		EXB1M108-		GND		EXB1M109+		EXB1M109-		GND		EXB1M110+		EXB1M110-		GND		EXB1M111+		EXB1M111-		GND		EXB1M112+		EXB1M112-		GND		EXB1M113+		EXB1M113-		GND		EXB1M114+		EXB1M114-		GND		EXB1M115+		EXB1M115-		GND		EXB1M116+		EXB1M116-		GND		EXB1M117+		EXB1M117-		GND		EXB1M118+		EXB1M118-		GND		EXB1M119+		EXB1M119-		GND		EXB1M120+		EXB1M120-		GND		EXB1M121+		EXB1M121-		GND		EXB1M122+		EXB1M122-		GND		EXB1M123+		EXB1M123-		GND		EXB1M124+		EXB1M124-		GND		EXB1M125+		EXB1M125-		GND		EXB1M126+		EXB1M126-		GND		EXB1M127+		EXB1M127-		GND		EXB1M128+		EXB1M128-		GND		EXB1M129+		EXB1M129-		GND		EXB1M130+		EXB1M130-		GND		EXB1M131+		EXB1M131-		GND		EXB1M132+		EXB1M132-		GND		EXB1M133+		EXB1M133-		GND		EXB1M134+		EXB1M134-		GND		EXB1M135+		EXB1M135-		GND		EXB1M136+		EXB1M136-		GND		EXB1M137+		EXB1M137-		GND		EXB1M138+		EXB1M138-		GND		EXB1M139+		EXB1M139-		GND		EXB1M140+		EXB1M140-		GND		EXB1M141+		EXB1M141-		GND		EXB1M142+		EXB1M142-		GND		EXB1M143+		EXB1M143-		GND		EXB1M144+		EXB1M144-		GND		EXB1M145+		EXB1M145-		GND		EXB1M146+		EXB1M146-		GND		EXB1M147+		EXB1M147-		GND		EXB1M148+		EXB1M148-		GND		EXB1M149+		EXB1M149-		GND		EXB1M150+		EXB1M150-		GND		EXB1M151+		EXB1M151-		GND		EXB1M152+		EXB1M152-		GND		EXB1M153+		EXB1M153-		GND		EXB1M154+		EXB1M154-		GND		EXB1M155+		EXB1M155-		GND		EXB1M156+		EXB1M156-		GND		EXB1M157+		EXB1M157-		GND		EXB1M158+		EXB1M158-		GND		EXB1M159+		EXB1M159-		GND		EXB1M160+		EXB1M160-		GND		EXB1M161+		EXB1M161-		GND		EXB1M162+		EXB1M162-		GND		EXB1M163+		EXB1M163-		GND		EXB1M164+		EXB1M164-		GND		EXB1M165+		EXB1M165-		GND		EXB1M166+		EXB1M166-		GND		EXB1M167+		EXB1M167-		GND		EXB1M168+		EXB1M168-		GND		EXB1M169+		EXB1M169-		GND		EXB1M170+		EXB1M170-		GND		EXB1M171+		EXB1M171-		GND		EXB1M172+		EXB1M172-		GND		EXB1M173+		EXB1M173-		GND		EXB1M174+		EXB1M174-		GND		EXB1M175+		EXB1M175-		GND		EXB1M176+		EXB1M176-		GND		EXB1M177+		EXB1M177-		GND		EXB1M178+		EXB1M178-		GND		EXB1M179+		EXB1M179-		GND		EXB1M180+		EXB1M180-		GND		EXB1M181+		EXB1M181-		GND		EXB1M182+		EXB1M182-		GND		EXB1M183+		EXB1M183-		GND		EXB1M184+		EXB1M184-		GND		EXB1M185+		EXB1M185-		GND		EXB1M186+		EXB1M186-		GND		EXB1M187+		EXB1M187-		GND		EXB1M188+		EXB1M188-		GND		EXB1M189+		EXB1M189-		GND		EXB1M190+		EXB1M190-		GND		EXB1M191+		EXB1M191-		GND		EXB1M192+		EXB1M192-		GND		EXB1M193+		EXB1M193-		GND		EXB1M194+		EXB1M194-		GND		EXB1M195+		EXB1M195-		GND		EXB1M196+		EXB1M196-		GND		EXB1M197+		EXB1M197-		GND		EXB1M198+		EXB1M198-		GND		EXB1M199+		EXB1M199-		GND		EXB1M200+		EXB1M200-		GND		EXB1M201+		EXB1M201-		GND		EXB1M202+		EXB1M202-		GND		EXB1M203+		EXB1M203-		GND		EXB1M204+		EXB1M204-		GND		EXB1M205+		EXB1M205-		GND		EXB1M206+		EXB1M206-		GND		EXB1M207+		EXB1M207-		GND		EXB1M208+		EXB1M208-		GND		EXB1M209+		EXB1M209-		GND		EXB1M210+		EXB1M210-		GND		EXB1M211+		EXB1M211-		GND		EXB1M212+		EXB1M212-		GND		EXB1M213+		EXB1M213-		GND		EXB1M214+		EXB1M214-		GND		EXB1M215+		EXB1M215-		GND		EXB1M216+		EXB1M216-		GND		EXB1M217+		EXB1M217-		GND		EXB1M218+		EXB1M218-		GND		EXB1M219+		EXB1M219-		GND		EXB1M220+		EXB1M220-		GND		EXB1M221+		EXB1M221-		GND		EXB1M222+		EXB1M222-		GND		EXB1M223+		EXB1M223-		GND		EXB1M224+		EXB1M224-		GND		EXB1M225+		EXB1M225-		GND		EXB1M226+		EXB1M226-		GND		EXB1M227+		EXB1M227-		GND		EXB1M228+		EXB1M228-		GND		EXB1M229+		EXB1M229-		GND		EXB1M230+		EXB1M230-		GND		EXB1M231+		EXB1M231-		GND		EXB1M232+		EXB1M232-		GND		EXB1M233+		EXB1M233-		GND		EXB1M234+		EXB1M234-		GND		EXB1M235+		EXB1M235-		GND		EXB1M236+		EXB1M236-		GND		EXB1M237+		EXB1M237-		GND		EXB1M238+		EXB1M238-		GND		EXB1M239+		EXB1M239-		GND		EXB1M240+		EXB1M240-		GND		EXB1M241+		EXB1M241-		GND		EXB1M242+		EXB1M242-		GND		EXB1M243+		EXB1M243-		GND		EXB1M244+		EXB1M244-		GND		EXB1M245+		EXB1M245-		GND		EXB1M246+		EXB1M246-		GND		EXB1M247+		EXB1M247-		GND		EXB1M248+		EXB1M248-		GND		EXB1M249+		EXB1M249-		GND		EXB1M250+		EXB1M250-		GND		EXB1M251+		EXB1M251-		GND		EXB1M252+		EXB1M252-		GND		EXB1M253+		EXB1M253-		GND		EXB1M254+		EXB1M254-		GND		EXB1M255+		EXB1M255-		GND		EXB1M256+		EXB1M256-		GND		EXB1M257+		EXB1M257-		GND		EXB1M258+		EXB1M258-		GND		EXB1M259+		EXB1M259-		GND		EXB1M260+		EXB1M260-		GND		EXB1M261+		EXB1M261-		GND		EXB1M262+		EXB1M262-		GND		EXB1M263+		EXB1M263-		GND		EXB1M264+		EXB1M264-		GND		EXB1M265+		EXB1M265-		GND		EXB1M266+		EXB1M266-		GND		EXB1M267+		EXB1M267-		GND		EXB1M268+		EXB1M268-		GND		EXB1M269+		EXB1M269-		GND		EXB1M270+		EXB1M270-		GND		EXB1M271+		EXB1M271-		GND		EXB1M272+		EXB1M272-		GND		EXB1M273+		EXB1M273-		GND		EXB1M274+		EXB1M274-		GND		EXB1M275+		EXB1M275-		GND		EXB1M276+		EXB1M276-		GND		EXB1M277+		EXB1M277-		GND		EXB1M278+		EXB1M278-		GND		EXB1M279+		EXB1M279-		GND		EXB1M280+		EXB1M280-		GND		EXB1M281+		EXB1M281-		GND		EXB1M282+		EXB1M282-		GND		EXB1M283+		EXB1M283-		GND		EXB1M284+		EXB1M284-		GND		EXB1M285+		EXB1M285-		GND		EXB1M286+		EXB1M286-		GND		EXB1M287+		EXB1M287-		GND		EXB1M288+		EXB1M288-		GND		EXB1M289+		EXB1M289-		GND		EXB1M290+		EXB1M290-		GND		EXB1M291+		EXB1M291-		GND		EXB1M292+		EXB1M292-		GND		EXB1M293+		EXB1M293-		GND		EXB1M294+		EXB1M294-		GND		EXB1M295+		EXB1M295-		GND		EXB1M296+		EXB1M296-		GND		EXB1M297+		EXB1M297-		GND		EXB1M298+		EXB1M298-		GND		EXB1M299+		EXB1M299-		GND		EXB1M300+		EXB1M300-		GND		EXB1M301+		EXB1M301-		GND		EXB1M302+		EXB1M302-		GND		EXB1M303+		EXB1M303-		GND		EXB1M304+		EXB1M304-		GND		EXB1M305+		EXB1M305-		GND		EXB1M306+		EXB1M306-		GND		EXB1M307+		EXB1M307-		GND		EXB1M308+		EXB1M308-		GND		EXB1M309+		EXB1M309-		GND		EXB1M310+		EXB1M310-		GND		EXB1M311+		EXB1M311-		GND		EXB1M312+		EXB1M312-		GND		EXB1M313+		EXB1M313-		GND		EXB1M314+		EXB1M314-		GND		EXB1M315+			
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CN1~CN4 pin arrangement

39	37	35	33	31	29	27	25	23	21
EXA1N0-	EXA1N0+	GND	NC	EXA1N2-	EXA1N2+	GND	NC	EXA1N3-	EXA1N3+
40									
39	38	36	34	32	30	28	26	24	22
NC	GND	EXA1N1-	EXA1N1+	NC	GND	EXA1N1-	EXA1N1+	NC	GND
P W B									

CN1~CN4 pin arrangement

1	BL 12V	11 BL GND
2	BL 12V	12 BL GND
3	BL 12V	13 BL GND
4	BL 12V	14 BL GND
5	BL 12V	15 BL GND
6	BL 12V	16 BL GND
7	BL 12V	17 GND
8	BL 12V	18 GND
9	BL GND	19 Vac 12V
10	BL GND	20 Vac 12V



CN5 pin arrangement

1	5.0V
2	V _{high}
3	V _{br}
4	V _{low}
5	GND

Fig. 5 MODULE OUTLINE 2/2

CN7 pin arrangement

9	7	5	3	1
0	0	0	0	0
0	0	0	0	0
1	0	8	6	4
2				

1	BITE-cable
2	INV-U
3	INV-M
4	INV-L
5	B/L-FUSE
6	VDD-FUSE
7	Sig-Detect
8	Reserve
9	GND 1
10	GND 2

CN6 pin arrangement